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many diseases of childhood in which the art of medicine, apart from its science, is of no great use, few are more unkind than infantile paralysis. It is the Rockefeller Institute that we must thank here. First came Flexner's magnificent work on epidemic cerebrospinal meningitis, and his discovery (1908) of the special antitoxin for that disease; then came the study of epidemic infantile paralysis. To have in one's hands, in a test-tube, infantile paralysis, is a grand experience for a man who has attended a children's hospital, year in year out, long before the Rockefeller Institute was born or thought of. It is enough to make him believe that the doctors some years hence may be able to stop the disease before it can inflict irremediable injury on the nerve cells of the spinal cord.

Finally, Professor Noguchi spoke of rabies (hydrophobia). He has been able to obtain, in pure culture, the microscopic bodies which Negri discovered in the brain in that disease. He demonstrated to the Royal Society of Medicine, on the lantern-screen, photographs showing the cycle—not unlike that of the *Plasmodium malarie*—through which these bodies pass until, like miniature shrapnell, they break, setting free their constituent granules; and each granule becomes a "Negri body," and starts the cycle again. Happily, the protective treatment against rabies did not have to wait for the discovery of these Negri bodies. Pasteur worked at rabies, as Reed and Lazear worked at yellow fever, knowing that the virus was there, and able to control, fight and beat it, without seeing it under the microscope.

The Royal Society of Medicine deserves the thanks of the public for inviting Professor Noguchi to give this demonstration in London. He is indeed, in width and originality of work, equal to his fellow-countryman, Professor Kitasato. He has helped to make it possible for men of science to extend to other diseases those methods of study which brought about the discovery of diphtheria antitoxin and the protective treatments against cholera, typhoid fever and plague.

STEPHEN PAGET

DIATOM COLLECTION OF THE UNITED STATES NATIONAL MUSEUM

DR. ALBERT MANN, author of the "Report on the Diatoms of the *Albatross* Voyages in the Pacific Ocean" and many other diatom papers, has recently been appointed custodian of the diatom collection of the United States National Museum. This collection already contains much valuable material, including the types of species accumulated by the late Professor H. L. Smith, of Geneva, New York, the specimens of all the species of the *Albatross* diatoms, and the extensive collection of diatom material of the late Professor C. Henry Kain, of Philadelphia, representing the principal fossil deposits throughout the world as well as a large number of recent gatherings made in this country and abroad. To the large amount of material thus brought together, there are being added the marine diatoms of the Shackleton Expedition to the South Pole, diatoms recently secured in the Panama Canal Zone by the Smithsonian Institution, and the pelagic coastal diatoms of the Atlantic seaboard now being collected under the auspices of the Cambridge Zoological Laboratory and the United States Bureau of Fisheries.

For the accommodation of the extensive series of specimens thus assembled a separate room in the National Herbarium has been fitted up with cases, microscope accessories, and other necessary apparatus. The action of the National Museum in thus affording proper facilities for diatom study is in accordance with a growing realization of the importance of these organisms in modern science. Until recently they were appreciated mainly because of their artistic beauty and their interesting microscopical structure. They are now coming to be recognized as constituting one of the fundamental food supplies of the marine world and as having an important bearing on oceanography and recent geology.

Collectors who donate diatom specimens to the National Museum may be assured that their collections will be carefully preserved and made available to diatom students. The number of types already brought together is

sufficiently large to insure a permanent value to this collection, and to warrant an attempt to make it as complete and comprehensive as may be practicable.

FREDERICK V. COVILLE,
Curator of Botany

SPECIAL ARTICLES

REVERSIBILITY IN ARTIFICIAL PARTHENOGENESIS

I

IN 1900 the writer pointed out that in *Campanularia* a highly differentiated organ like the polyp may be transformed into the less differentiated material of the stem, which in turn may form a new polyp.¹ Since then, reversibility of certain phenomena of differentiation has been observed by Driesch, Child, F. Lillie, Schultz and others.

The writer has repeatedly tried to reverse the phenomena of development in the egg of *Strongylocentrotus* fertilized with sperm but thus far without success. Experiments on artificial parthenogenesis, however, gave positive results.

It is difficult to cause artificial parthenogenesis in the eggs of the Californian sea urchin with hypertonic sea water. If we treat these eggs for about 2 or 2½ hours with such a solution (50 c.c. sea water + 8 c.c. 2½ *m* NaCl + CaCl₂ + KCl) it often happens that a certain percentage of eggs, after they have been returned to normal sea water, begin to segment regularly in 2, 4 or even 8 or 16 cells. They then stop developing and go into the condition resembling that of a resting egg. If such blastomeres are at any time fertilized with sperm they will develop into larvæ in a perfectly normal way.² These observations show incidentally that it is not the lack of the organs of cell division which prevents the unfertilized eggs from developing, since these eggs had been in possession of these organs.

The writer has shown that the induction of development in the egg is due to a combination of at least two agencies. The one causes

an alteration of the surface (which may or may not be followed by a membrane formation) and this alteration starts the development of the egg, but leaves it, in many cases at least, in a sickly condition from which it can be freed by the application of the second, corrective agency. The alteration of the surface may be caused by any of those substances or conditions which cause hemolysis: acids, bases, hydrocarbons, hypertonic and hypotonic salt solutions, foreign blood, etc. The second, curative effect may be produced by a short treatment of the egg with a hypertonic solution or by a suppression of the development of the egg for a somewhat longer period by lack of oxygen or by KCN. One method of causing artificial parthenogenesis in the eggs of *Arbacia* consists in putting them for about 20 minutes into a mixture of 50 c.c. *m*/2 (NaCl + KCl + CaCl₂) + 0.3 c.c. *N*/10 NH₄OH and subsequently into a neutral hypertonic solution for from 15 to 20 minutes (the figures are given for about 22° C.). A varying percentage of eggs treated this way will develop into embryos and the rest will perish very rapidly. If the eggs are treated with the alkaline solution alone without subsequent treatment with the hypertonic solution they will begin to segment, but they will perish rapidly. The alkaline treatment alone induces the change in the surface of the egg required to start the development, but this, without the corrective treatment, leads only to the first segmentations followed by a rapid disintegration.

The writer found last summer that these effects are reversible in the eggs of *Arbacia*. If, after the treatment with alkaline solution alone or with alkaline and hypertonic solution, the eggs of *Arbacia* are put for a sufficient length of time into sea water containing a certain amount of NaCN or of chloralhydrate, they go back into the resting stage and behave in appearance and reaction like unfertilized eggs. Both the NaCN and the chloralhydrate prevent the developmental processes in the egg. The suppression of these processes of development reverses the changes induced in the egg by the treatment with alkali. If after

¹ *Am. Jour. Physiol.*, IV., 60, 1900.

² *Arch. f. Entwicklgsmech.*, XXIII., 479, 1907; *Jour. Exper. Zool.*, XV., 201, 1913.